

**STATE OF MAINE**

**2002 INTEGRATED WATER QUALITY  
MONITORING AND ASSESSMENT REPORT**

**A Report to Congress  
Prepared Pursuant to Section 305(b) of the  
Federal Water Pollution Control Act, as Amended**

**Prepared by the  
Maine Department of Environmental Protection  
Bureau of Land and Water Quality**

**Document Number DEPLW0633**



## **Table of Contents**

	<b><u>Page</u></b>
<b>Part I. Overview</b>	<b>A-5</b>
<b>Introduction</b>	<b>A-5</b>
<b>Data Sources and Acknowledgements</b>	<b>A-7</b>
<b>Listing Methodology</b>	<b>A-9</b>
<b>Assessment Criteria</b>	<b>A-15</b>
<b>Monitoring and TMDL Schedules</b>	<b>A-20</b>
<b>Response to Comments</b>	<b>A-22</b>
<b>10 Digit HUC Map</b>	<b>A-25</b>
<b>Part II. Summary Assessment of Freshwater Rivers             and Streams</b>	<b>A-27</b>
<b>Part III. Summary Assessment of Lakes</b>	<b>A-32</b>
<b>Part IV. Summary Assessment of Estuarine and             Marine Waters</b>	<b>A-40</b>
<b>Part V. Groundwater Assessment</b>	<b>B-1</b>
<b>Part VI. Wetlands Assessment</b>	<b>C-1</b>
<b>Appendices</b>	<b>D-1</b>



## **Part I. Overview**

### **INTRODUCTION**

The following report is submitted to satisfy the requirements of the Clean Water Act (CWA) Section 305(b) report, Section 303(d) list, Section 314 and as a biennial report to the Maine Legislature as required in 38 MRSA Section 464.3.A. The Clean Water Act Section 305(b) report and Section 303(d) list are an important way of communicating the health and status of our State's waters. This report is a significant change from previous 305(b) reports and 303(d) lists in that it integrates the requirements of the two sections of the CWA into a single document. This Integrated Report provides:

- Delineation of water quality assessment units (AUs) based on the National Hydrography Dataset (NHD), identified by their 10-digit Hydrologic Unit Code (HUC)
- Water quality attainment status for every Assessment Unit
- Status of and progress toward achieving comprehensive assessment of all waters,
- Basis for the water quality standard attainment determinations for each Assessment Unit,
- Schedules for additional monitoring planned for certain Assessment Units,
- Identifies Assessment Units requiring Total maximum Daily Load (TMDL) determinations and establishes a schedule (priority) for those waters.

A key new feature of this report is the establishment of five new assessment categories (see section on listing methods). The new assessment categories require a reordering of the attainment assessment different from previous 305b reports and thus may not be readily comparable. In particular, impaired waters that were previously combined into a single 303d list are now separated into a number of lists under categories 4 and 5. Only those under category 5 will require development and submission of Total Maximum Daily Load (TMDL) reports.

Assessment information will also be submitted to the USEPA in their Assessment Database (ADB version 1.0 or compatible format). The ADB contains information on Assessment Unit and segment descriptions (dimensions, designated uses), assessment date, monitoring dates, types of information used in the assessment, and if use impairment is determined, the probable causes and sources. The current ADB version does not list the assessment category that is provided in the appendices of this report. The ADB allows for the construction a number of 'reports' that summarize information in the database. These are the basis for a number of the summary tables provided in the different chapters.

As a consequence of conversion to the ADB and adoption of Assessment Units based on the Hydrologic Unit Code (HUC – 10 digit), the number of river miles used in this 305b report deviates slightly from that used in previous 305b reports ( 31,171 miles currently used vs. 31,672 miles previously used). Some segment lengths have also changed somewhat based on the new coverage.

The total number of lakes (and lake acres) has changed slightly since the 2000 assessment and is expected to change in the future as the Department migrates to a spatially-oriented GIS system for the management of location information and morphometric data.

Current guidance for the Integrated Report does not require that the State provide information on groundwater or wetland resources as in previous years. However, Maine has included an assessment of these resources in this report using the 1998 305b guidance document (see Parts V and VI).

## **DATA SOURCES AND ACKNOWLEDGEMENTS**

### **Sources of River and Stream Assessment Data**

The Department generates much of the data for the assessment through the various monitoring programs it conducts, notably the Biomonitoring Program, Surface Water Ambient Toxics Monitoring Program, the Dioxin Monitoring Program, Atlantic Salmon Recovery Plan. Additionally, data is provided from a variety of professional and volunteer monitoring groups. These include other state agencies and resources (Department of Inland Fisheries and Wildlife, Atlantic Salmon Commission, Department of Human Services, University of Maine System), federal agencies (U.S. Environmental Protection Agency, U.S. Geological Survey, National Park Service), other governmental agencies (Saco River Corridor Commission, St. Croix International Waterway Commission), tribes (Penobscot Indian Nation, Houlton Band of Maliseets) and a number of volunteer watershed groups and conservation organizations (Watershed councils of the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap and Sheepscot Rivers, Presumpscot River Watch, Friends of the Royal River, Sheepscot Valley Conservation Association, The Nature Conservancy).

### **Sources of Lake Assessment Data**

The Department's Lake Assessment Section manages much of the data collected from lakes within the state. A strong partnership with the Maine Volunteer Lakes Monitoring Program (V.L.M.P., Inc.) assures the quality and comparability of the data collected through numerous regional entities and local lake associations. Regional entities include Cobbossee Watershed District, Lakes Environmental Association, St. Croix International Waterway Commission, Penobscot Indian Nation, Portland Water District, Auburn Water District, Acadia National Park, and Rangeley Lakes Heritage Trust. Data has also been acquired from private consultants (such as Lake and Watershed Resource Management Assoc., Biodiversity Research Institute, Florida Power and Light as part of regulatory requirements). Water utilities that belong to Maine Association of Water Districts will join this list in future years. Additional data is acquired through the Maine Department of Inland Fisheries & Wildlife (DIF&W) and through cooperative projects with the University of Maine System, Unity College, Soil and Water Conservation Districts and similar entities.

### **Sources of Marine Assessment Data**

The Maine Department of Environmental Protection (DEP), the Department of Marine Resources (DMR), the Casco Bay Estuary Project (CBEP) and a variety of volunteer monitoring groups monitor Maine's coastal waters. DMR monitors for indicators of human pathogens (fecal coliforms) and biotoxins (Paralytic Shellfish Poisoning). The purpose of the DMR monitoring is to protect human health by managing shellfish harvest areas. DEP monitors toxic contaminants in tissues and assesses water quality using data collected by DEP, especially the Surface Water Ambient Toxics program, and others.

DEP participates in the Gulf of Maine Council's Gulfwatch Project that surveys toxic contamination in mussel tissue in the Gulf of Maine. The Maine State Planning Office, the University of Maine Cooperative Extension, Sea Grant, DMR and DEP collaborate in the Maine Shore Stewards Program to provide training, community support, information, grants and education for volunteer groups. The University of Maine Cooperative Extension runs the Clean Water/Partners in Monitoring program, the Marine Phytoplankton Monitoring Program and, with the participating state agencies, the marine Healthy Beaches program. DMR runs the Shellfish Sanitation Program Water Quality Volunteers program that is specifically focused on shellfish growing areas. The Casco Bay Estuary Project (CBEP), funded by EPA's National Estuary Program, monitors and supports monitoring in Casco Bay and coordinates the National Coastal Assessment for the entire Maine coast.



## LISTING METHODOLOGY FOR 2002 305b/303d INTEGRATED LIST

Determination of attainment is based on attainment of all standards and criteria established by a water's classification (38 MRSA Section 465, 465-A, 465-B). Listing does not consider fish consumption advisories due to mercury (note: all freshwaters are listed narratively in 5-C as well as in one other category. See explanation in 5-C.), or for lobster tomalley (note: all marine waters are listed narratively in 5-D as well as in one other category. See explanation in 5-D).

The "Monitored Date" shown in the assessment tables indicates the year of the most recent data acquisition. The term "Evaluated" is used when the data used to make the assessment is greater than five years old or where qualitative information is used.

### Listing Categories (1-5)

**1. Attaining all designated uses and water quality standards, and no use is threatened.** Highest level, waters in the assessment unit attain all applicable standards. Assessment is based on combined evaluation of the following information.

1. Current data (collected within five years) indicating attainment, no trend toward expected non-attainment within the listing period.
2. Old data (greater than five years) indicating attainment and no change in associated conditions.
3. Water quality models that predict attainment under current loading, no projected change in loading that would predict non-attainment.
4. Qualitative data or information from professional sources showing attainment of standards and showing no identifiable sources (e.g. no detectable points of entry of either licensed or unlicensed wastes), low impact land use (e.g. intact riparian buffers, >90% forested watershed, little impervious surface), watershed within state or federal reserve land, park, wilderness area or similar conservation protection, essentially unaltered habitat, and absence of other potential stressors.
5. (For lakes) Determination that the direct drainage area has a population of zero (0) according to U.S. Census data obtained in 2000. Determinations are based on census data at the town level and consider all towns in the direct drainage of larger (previously referred to as "significant") lakes. Populations for the remaining lakes (generally less than ten acres) are determined for the town listed as the point-of-record for the water according to the Department of Inland Fisheries and Wildlife Index database.

**2. Attains some of the designated uses; no use is threatened; and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).** Assessment is based on combined evaluation of the following information.

1. Current data (collected within five years) for some standards indicating attainment, no trend toward expected non-attainment within the listing period, or inadequate density of data to evaluate a trend.
2. Old data (greater than five years) for some standards indicating attainment, and no change in associated conditions.
3. Water quality models that predict attainment under current loading for some standards, no projected change in loading that would predict non-attainment.
4. (For lakes) Probabilistic-based monitoring that indicates a high expectation of use attainment for certain classes of waters based on a random monitoring of that class of waters.
5. Insufficient data for some standards but qualitative data/information from professional sources indicating low likelihood of impairment from any potential sources (e.g. high dilution, intermittent/seasonal effects, low intensity land use).

**3. Insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).** Assessment is based on combined evaluation of the following information. Monitoring schedules are assigned to these waters.

1. Insufficient or conflicting data that does not confirm either attainment or nonattainment of uses.
2. Qualitative data or information from professional sources showing potential presence of stressors that may cause impairment of one or more uses, but no quantitative water quality information.
3. Old data, with:
  - a. low reliability, no repeat measurement (e.g. one-time synoptic data),
  - b. change of conditions without subsequent remeasurement, or
  - c. no evidence of causes or sources to account for water quality condition (natural conditions that don't attain water quality standards are allowed by 38 M.R.S.A. Section 464.4.C).
4. (For lakes) Recent data indicates return to attainment standards over the recent few years but requires confirmation, or, that trophic or dissolved oxygen profile evaluation suggests deteriorating conditions requiring verification. (Since lakes

respond over a longer period of time and can be highly influenced by weather attributes, it is appropriate to recommend additional monitoring before attainment is determined.)

**4. Impaired or threatened for one or more designated uses, but does not require development of a TMDL.** A water body is listed in category 4 when impairment is not caused by a pollutant, or if it is impaired by a pollutant where a TMDL has already been completed or other enforceable controls are in place. An impaired waterbody will be listed in category 5 if both a pollutant and a non-pollutant are involved that would independently cause an impaired or threatened condition. Waters are listed in one of the Category 4 lists when:

1. Current or old data (from previous listing) for a standard indicating impaired use, or a trend toward expected non-attainment within the listing period, but where enforceable management changes are expected to correct the condition,
2. Water quality models that predict impaired use under current loading for some standard, but prediction of attainment when controls are in place, or,
3. Quantitative or qualitative data/information from professional sources indicating that the cause of impaired use is not from a pollutant(s) (e.g. habitat modification).

**4-A. TMDL is completed.** TMDL complete but insufficient new data to determine that attainment has been achieved.

**4-B. Other pollution control requirements reasonably expected to result in attainment of standards in the near future.**

Waterbodies where enforceable controls (including new wastewater discharge licenses issued without preparation of a TMDL, other regulatory orders, contracts for nonpoint source implementation projects, regulatory orders or contracts for hazardous waste remediation projects) have reasonable expectation of attaining standards, but where no new data are available to determine that attainment has been achieved.

**4-C. Impairment not caused by a pollutant. Waters impaired by habitat modification.**

**5. Impaired or threatened for one or more designated uses by a pollutant(s), TMDL required.** Waters are listed in one of the Category 5 lists when:

1. Current data (collected within five years) for a standard indicating impaired use, or a trend toward expected impairment within the listing period, and where quantitative or qualitative data/information from professional sources indicates that the cause of impaired use is from a pollutant(s),

2. Water quality models that predict impaired use under current loading for a standard, and where quantitative or qualitative data/information from professional sources indicates that the cause of impaired use is from a pollutant(s), or,

3. A water has been previously listed on the State's 303d list of impaired waters. Based on current or old data that indicated the involvement of a pollutant(s), and there is no change in management or conditions that would indicate attainment of use. (Note that a few previously listed waters have been moved to Category 3 if the previous listing was based on data that does not meet present assessment methodology quality or errors may have been made in the analysis. See Category 3.)

**5-A. Impairment caused by pollutants (other than those listed in 5-B thru 5-D). TMDL required, to be conducted by the State of Maine.**  
**A projected schedule for TMDL completion is included.**

**5-B. Impairment caused solely by bacteria contamination, TMDL required.**

**5-B-1.** Certain waters impaired only by high bacteria contamination may be high priority resources, such as shellfish areas, but low priority for TMDL development if other actions are already in progress and will correct the problem in advance of TMDL development (e.g. OBD removals). Certain small streams that are impaired solely by bacteria contamination but where recreation (swimming) is impractical because of their small size are listed in 5-B-1. A projected schedule of TMDL completion is included where applicable.

**5-B-2.** Waterbodies impaired by bacteria contamination solely from Combined Sewer Overflows and with current CSO Master Plans (Long Term Control Plans) which include assurances that water quality standards will be attained.

**5-C. Impairment caused by atmospheric deposition (all Maine freshwaters are listed as 5-C and are also listed under one of the other categories), regional scale TMDL required.** Maine has a fish consumption advisory for fish taken from all freshwaters due to mercury. Many waters, and many fish from any water, do not exceed the action level for mercury. There is considerable variation in the amount of mercury in a particular fish depending on the species, age, size, water it was taken from, and other factors. Therefore, because it is impossible for someone consuming a fish to know whether the mercury level exceeds the action level, the Maine Department of Human Services has decided to establish a statewide advisory for all freshwater fish that recommends limits on consumption thus reducing the potential for an individual to consume too much mercury. The State of Maine is participating in the development of regional scale TMDLs for the control of mercury.\_

#### **5-D. Impairment caused by a “legacy” pollutant.**

- Includes waters impaired only by PCBs, DDT or other substances already banned from production or use, or from activities that have been long abandoned. Includes waters impaired by contaminated sediments where there is no additional extrinsic load occurring. This is a low priority for TMDL development since there is no controllable load.
- Includes coastal waters that have a consumption advisory for the tomalley (hepato-pancreas organ) of lobsters due to the presence of persistent bioaccumulating toxics found in that organ. This is a low priority for TMDL development since there is no identifiable and controllable load.

#### **Delisting from the previous 303(d) impaired waters list**

Because there are a number of listing options available in this new integrated list, some waterbodies may be removed from the previous 303(d) list, however, only under certain circumstances. A State must describe a good cause demonstration, to EPA’s satisfaction, for not listing a specific water that had been previously listed on a 303(d) list. Acceptable reasons for not listing a previously listed water as provided in 40 CFR 130.7(b) may include situations where:

1. The assessment and interpretation of more recent or more accurate data demonstrates that the applicable water quality standard(s) is being met (list in Category 1, 2, (3 for lakes);
2. The results of more sophisticated water quality modeling demonstrates that the applicable water quality standard(s) is being met (list in Category 1 or 2);
3. It can be demonstrated that errors or insufficiencies in the original data and information led to the water being incorrectly listed (list in Category 3);
4. It can be documented that there are changes in the conditions that originally caused the water to be impaired and therefore originally led to the listing. For example, new control equipment has been installed, or a discharge has been eliminated (list in Category 1, 2, 3, or 4-B).
5. The State has demonstrated pursuant to 40 CFR 130.7(b)(1)(ii), that there are effluent limitations required by State or local authority, which are more stringent than technology-based effluent limitations, required by the Clean Water Act, and that these more stringent effluent limitations will result in the attainment of water quality standards for the pollutant causing the impairment within a reasonable time (list in Category 4-B);
6. The State has demonstrated pursuant to 40 CFR 130.7(b)(1)(iii), that there are other pollution control requirements required by State, local, or federal authority that will result in attainment of water quality standards for a specific pollutant(s) within a reasonable time (list in Category 4-B).
7. The State included on a previous Section 303(d) list some Water Quality Limited Segments beyond those that are required by EPA regulations, e.g.,

waters where there is no pollutant associated with the impairment (list in Category 4-C).

8. A TMDL has been approved or established by EPA since the last 303(d) list (list in Category 4-A).

In all cases of delisting to Category 3, more recent data or information indicate probable compliance with water quality standards. However, the State has chosen to place these waters in Category 3 to reflect its intention of doing additional confirmatory monitoring.

## ASSESSMENT CRITERIA

The following tables provide the designated use categories and the criteria (with references) used to assess attainment of the use. A determination of nonattainment is only made when there is documented evidence (e.g. monitoring data) that indicates that one or more criteria are not attained. Such data are also weighed against evidence that there are plausible human-caused factors that may contribute to the violation of criteria (38 MRSA Section 464.4.C).

### Rivers and Streams

Designated use	Criteria for attainment
Drinking water supply after disinfection/treatment	<ul style="list-style-type: none"> <li>• Ambient Water Quality Criteria (Maine DEP Chapter 530.5)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Aquatic life use support	<ul style="list-style-type: none"> <li>• Biomonitoring criteria (Maine DEP Chapter 579 draft)</li> <li>• Dissolved oxygen (38 MRSA Section 465)</li> <li>• Ambient Water Quality Criteria (Maine DEP Chapter 530.5)</li> <li>• Support of indigenous species</li> <li>• Wetted habitat (Maine DEP Chapter 581)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Support of indigenous fish species</li> <li>• No consumption advisory (established by Maine DHS)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Recreation in and on the water	<ul style="list-style-type: none"> <li>• <i>E. coli</i> bacteria (38 MRSA Section 465, geometric mean)</li> <li>• Water color (38 MRSA Section 414-C)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Navigation, hydropower, agriculture/industrial supply	<ul style="list-style-type: none"> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>

## Lakes and Ponds

Designated use	Criteria for attainment
Drinking water supply after disinfection/treatment	<ul style="list-style-type: none"> <li>• Ambient Water Quality Criteria (Maine DEP Chapter 530.5)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Aquatic life use support	<ul style="list-style-type: none"> <li>• Trophic state (38 MRSA Section 465-A, DEP Chapter 581)</li> <li>• Ambient Water Quality Criteria (Maine DEP Chapter 530.5)</li> <li>• Wetted habitat (DEP Chapter 581)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Support of indigenous fish species</li> <li>• No consumption advisory (established by Maine DHS)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Recreation in and on the water	<ul style="list-style-type: none"> <li>• <i>E. coli</i> bacteria (38 MRSA Section 465-A, geometric mean)</li> <li>• Trophic state (38 MRSA Section 465-A, DEP Chapter 581)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Navigation, hydropower, agriculture/industrial supply	<ul style="list-style-type: none"> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>



## Estuarine and Marine Waters

Designated use	Criteria for attainment
Marine life use support	<ul style="list-style-type: none"> <li>• Ambient Water Quality Criteria (Maine DEP Chapter 530.5)</li> <li>• Dissolved oxygen (38 MRSA Section 465-B)</li> <li>• Narrative biological standards (38 MRSA Section 465-B)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Shellfish propagation and harvest	<ul style="list-style-type: none"> <li>• National Shellfish Sanitation Program (as assessed by DMR)</li> <li>• No consumption advisory (Maine DHS)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Aquaculture	<ul style="list-style-type: none"> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>• Support of indigenous fish species</li> <li>• No consumption advisory (Maine DHS)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Recreation in and on the water	<ul style="list-style-type: none"> <li>• Enterococcus bacteria (38 MRSA Section 465-B, geometric mean)</li> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>
Navigation, hydropower, industrial supply	<ul style="list-style-type: none"> <li>• General provisions: floating/settleable solids, pH, radioactive substances, (38 MRSA Section 464.4.A)</li> </ul>

## Interpretation of the data

It is not common to have complete and consistent water quality data, therefore, some interpretation of data is required in making a final assessment. Data from unique events such as a spill, accident, short duration license exceedence, or flood are not used in an assessment determination. The following general principles for each criteria type are used in making an assessment:

**Biomonitoring criteria :** Assessment based on probability results of the biocriteria models, attainment >0.6. Professional judgement may be used in accordance with the procedures in Maine DEP Chapter 579 (draft).

**Lake Trophic State:** Assessment is based on measures of transparency, chlorophyll a, total phosphorus and color (see table). When lakes lack this information, a trophic determination made by DIF&W is used if available. Their determination is more subjective and generally applies to the lake system as a whole including adjacent wetlands and fisheries productivity. Trophic determination is tracked by source (DEP or DIF&W) in the assessment database.

**Numerical Criteria for Evaluation of Trophic Status in Maine** (Note: Dystrophy is not evaluated as a trophic category separately from categories below.)

Parameter <sup>1</sup>	Trophic Status		
	Oligotrophic	Mesotrophic <sup>2</sup>	Eutrophic
SDT <sup>3</sup>	> 8 M	4-8 M	< 4 M
CHL a	< 1.5 ppb	1.5 – 7 ppb	> 7 ppb
Total Phosphorus <sup>3</sup>	< 4.5 ppb	4.5 – 20 ppb	>20 ppb
TSI <sup>3,4</sup>	0-25	25-60	>60 &/or repeated algal blooms

<sup>1</sup> SDT, CHL a, Total Phosphorus based on long term means.

<sup>2</sup> No repeated nuisance algal blooms

<sup>3</sup> If color is > 30 Standard Platinum Units (SPU) or not known, chlorophyll a concentration (CHL a) and best professional judgment must be used to assign trophic category.

<sup>4</sup> TSI = Trophic State Indices are calculated when adequate data exists and color is at or below 30 SPU.

**Support of indigenous species:** Assessment based on the known absence of a species that previously was documented as indigenous to a waterbody.

**Dissolved oxygen:** Assessment is based on the results of repeated measurements. Single excursions below the criteria, or excursions within the range of sampling or instrument error (as established in a Quality Assurance Project Plan) are generally disregarded. Assessment may also be based on the use of water quality models (e.g. QUAL2E) based on present loading information, or expected loadings (for threatened waters).

Ambient water quality criteria: Assessment is based on repeated measurements. Single excursions above the criteria, or excursions within the range of sampling or instrument error (as established in a Quality Assurance Project Plan) are generally disregarded. Assessment may also be based on the use of water quality models (e.g. dilution models) based on present loading information, or expected loadings (for threatened waters).

Bacteria: Assessment is based on repeated measurements to establish an annual geometric mean. Instantaneous (single sample) criteria are not used for water quality assessment due to the high variability associated with a single measurement.

Water color: Assessment based on repeated measurements of discharge performance data (pulp and paper discharges only).

General provisions: pH based on repeated measurement (between 6.0 and 8.5), however, certain naturally occurring waterbody types (e.g. bogs, aquifer lakes, high elevation lakes) or events may naturally have low pH and affect downstream waters. Use impairment from solids is subjectively determined. Radioactivity is not presently monitored.

## **MONITORING AND TMDL SCHEDULES**

### **Rivers and Streams**

The Maine Department of Environmental Protection uses a five year rotation schedule for monitoring rivers and streams. The Surface Water Ambient Toxics program and Biomonitoring program generally adhere to this schedule although special monitoring demands may cause some waters to be monitored out of sequence. The following rotation is projected for the next five years:

- 2003 – Androscoggin River basin
- 2004 – St. John River and Presumpscot River basins
- 2005 – Saco River and southern Maine river basins
- 2006 – Penobscot River, St. Croix River and downeast river basins
- 2007 – Kennebec River basin

The projected monitoring schedule for Category 3 waters is assigned based on the above rotation. In addition to regular monitoring conducted on this schedule, the State regularly conducts river-scale water quality monitoring to develop and update water quality models. In the next two years, Maine will be conducting such monitoring on the Sandy River, Sebasticook River, St. Croix River and Presumpscot River.

### **Lakes**

Lakes are monitored as a statewide unit since much of the screening is conducted by individuals, regional entities or local organizations through the Volunteer Lake Monitoring Program (VLMP). The Department's Lake Assessment Section conducts various levels of monitoring on lakes depending on their attainment status. For example, lakes in the VLMP that are attaining all or most of their standards are visited once every 5 years during August to obtain data from parameters in addition to those routinely gathered by the volunteers to aid in the interpretation of volunteer-collected data. Lakes in non-attainment that are in the process of having TMDLs developed are generally monitored through the Department or by cooperators at a more intensive level (twice a month during the ice-free season; 2-3 trophic parameters). Lakes that have had TMDLs completed (4a), or that are on the Category 3 Watch List are often monitored once a month during the summer season by Department staff or cooperators. Other lakes in Category 3 are monitored less frequently because risk of being in non-attainment has decreased (e.g., removal of discharge). A few lakes-of-interest are also monitored once a month to track success of past restoration efforts under Section 314 or removal of point source discharges. Lakes slated for TMDL development in the distant future are visited every few years to verify that non-attainment is still an issue; often these lakes have a 'chronic' issue that needs to be treated differently than the majority of non-attainment lakes.

August baseline monitoring occurs from August 10<sup>th</sup> through August 31<sup>st</sup>. Generally 120 lakes are visited. Approximately 40 are VLMP lakes that are in attainment. Another 15-20 lakes located in areas designated as EcoReserves by the Maine Department of Conservation or The Nature Conservancy are included. All active TMDL lakes are visited as well as lakes with active NonPoint Source projects being implemented in their

watersheds (under Section 319). Lakes with special concerns due to anecdotal reports of unusual events (e.g., planktonic algal blooms, blooms of near shore algal metaphyton) are often visited during the baseline period.

### **Marine and Estuarine**

The Maine Department of Environmental Protection uses a three year rotation for marine waters. However, since 2000, the State has devoted a larger share of its monitoring resources to the USEPA Coastal Assessment Program. This is a probability based monitoring design. The Department is largely dependent on the monitoring efforts of the Department of Marine Resources for the listed Category 3 waters. A schedule from DMR is not available at this time.

### **TMDL Schedules**

TMDL schedules are assigned based on the value of a water (based on size, public use, proximity to population centers, and especially by the level of public interest for water quality improvement), the nature of the impairment and the source of the problem (Maine has generally pursued point sources as a higher priority), available information to complete the TMDL, and availability of staff and contractual resources to acquire information and complete the TMDL study. TMDL schedules that indicate 2004 are for impaired segments where a TMDL is reasonably expected to be complete by the end of this listing cycle. Other TMDLs are projected for four (2008) or eight year (2012) planning increments. The schedules for the latter TMDLs may be adjusted when the integrated list is revised in the future.

## RESPONSE TO COMMENTS

Public review and comment of the 2002 INTEGRATED WATER QUALITY MONITORING AND ASSESSMENT REPORT was invited by public notice advertisement in statewide newspapers, through the comment page on the DEP website, and through press release. Notice of the draft report was sent to all parties on the mailing list of interest groups maintained by the Board of Environmental Protection. Notice of the draft report also went out to all state natural resource agencies. The comment period ran from October 1-November 1, 2002. Internal departmental, along with EPA, review and comments on the document were also included in the final draft.

Public comments were received from the Conservation Law Foundation (CLF) and Maine Real Estate Development Association (MERDA). The following issues from those comments are paraphrased below with agency response about how those issues are addressed in the final draft:

- *The DEP fails to give sufficient information for de-listing a waterbody from the 303(d) list (CLF).* Reasons for de-listing are summarized in the Listing Methodology section and follow the allowable causes provided in 40 CFR 130.7(b). Where a specific waterbody has been de-listed (from the previous 303(d) list) and placed in Category 2-3, comments are now provided in the Comments column of the assessment tables. Impaired waters that have been moved from the previous 303(d) list to Category 4 are placed in the appropriate listing of that category. These waters are still listed as impaired, however, may not require a TMDL under the new listing protocol.
- *The DEP has improperly placed certain impaired waterbodies in Category 3 (CLF).* The DEP has followed de-listing as provided in 40 CFR 130.7(b). It should be noted that text has been added in the Listing Methodology narrative stating, “In all cases of de-listing to Category 3, more recent data or information indicate probable compliance with water quality standards. However, the State has chosen to place these waters in Category 3 to reflect its intention of doing additional confirmatory monitoring.” It is not the intention of the State to consider these waters unimpaired, but rather to provide an opportunity for the State to document, with reasonable confidence, that impairment occurs and to identify potential causes and sources of an impairment. For many of these waters, either due to insufficient, inconclusive, or conflicting data, the DEP does not have reasonable confidence of its assessment. It should also be noted that after consultation with EPA on the Category 3 list, certain waters were moved from Category 3 back into an impaired listing.
- *TMDLs should be prepared for certain Category 4 waters (CLF).* Waters are only placed in Category 4 if there has been a determination that a TMDL is not warranted. The list of CSO waters that caused this concern has been amended, in consultation with EPA, and most CSO-affected waters have been re-listed in Category 5-B-2. In the case of Rockland Harbor noted by CLF, the DEP does not have information to indicate that impairment is due to sources other than the CSOs. As stated in the

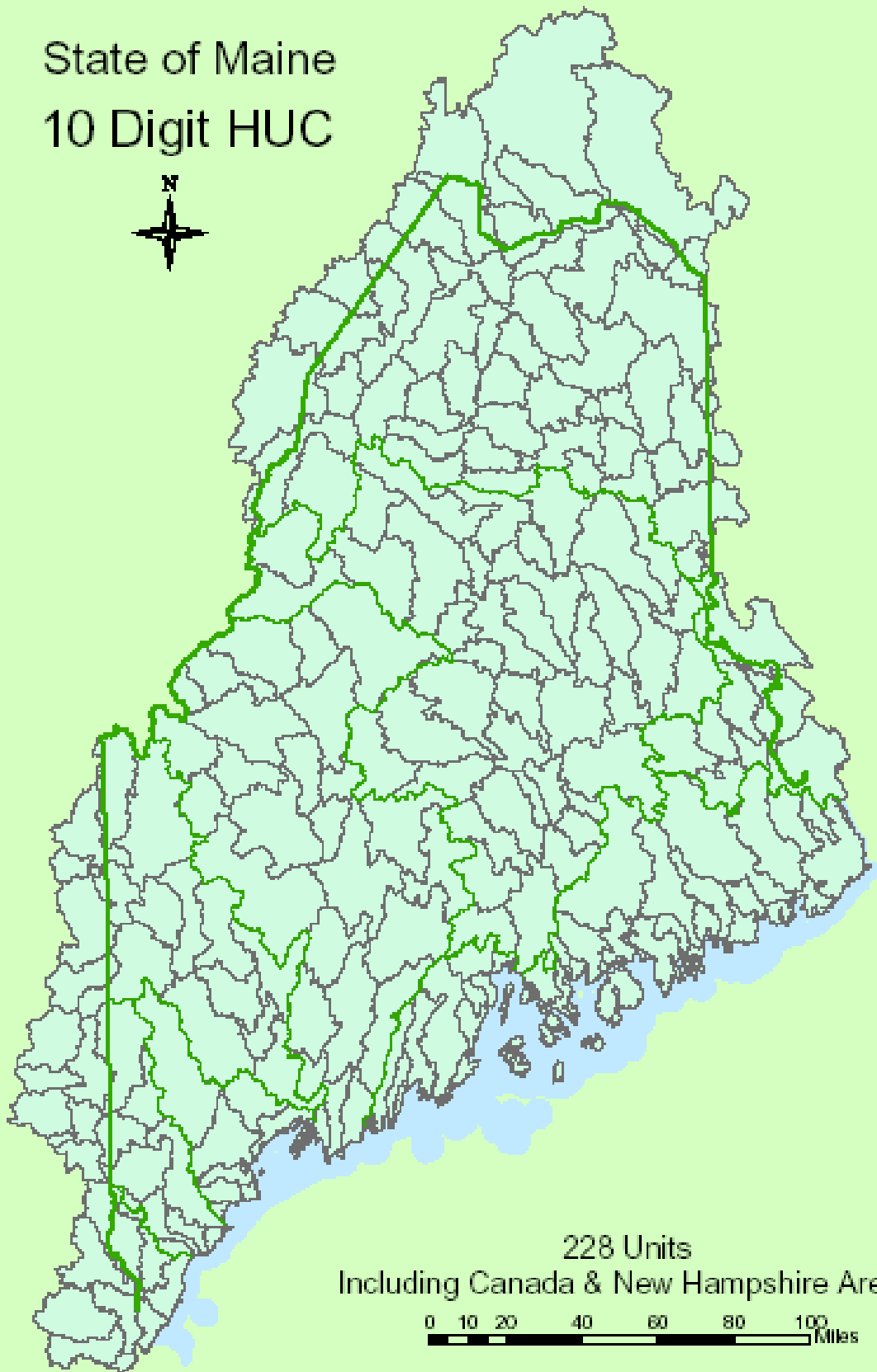
document, license violations are not used to establish a water as impaired and are considered a compliance issue. Enforcement of license violations is expected to result in attainment of water quality standards.

- *Certain waters closed to shellfishing by DMR are placed in Category 3 if there is not an identified source. (CLF).* DMR may close waters to shellfishing for a variety of reasons, and in many cases no ambient water quality data may be available to establish that water quality has been documented as the cause for closure. In those instances, the DEP has determined that a Category 3 listing is the most appropriate category until actual water quality conditions can be ascertained.
- *Wording under Category 4 infers that certain of these waters are partially impaired and therefore were not listed in Category 5 and do not require a TMDL (CLF).* The term “partial impairment” was only used as a footnote in Category 4-B-2 for CSO listed waters. CSOs present a unique circumstance where impairment only occurs under certain short-term event conditions. Waterbodies are not placed in Category 4 because of partial-impairment but rather because there is already a control mechanism in place that precludes the need for a TMDL analysis to occur. The Category 4-B-2 CSO list has been moved to Category 5-B-2 following recommendations from EPA. It is still the State’s intention to avoid conducting a TMDL analysis of these waters pending resolution of water impairment issues through abatement provided in the facility CSO Master Plans.
- *The DEP may have overstated its summary of state’s waters and that some statement of confidence should be made about the findings (CLF).* The DEP agrees that any summary of impairment is not complete but rather reflects current knowledge of water quality. Wording in the document is amended to reflect this.
- *Concern for large number of Category 3 waters in the marine assessment and the possible use of other data sources (CLF).* Many waters are listed in Category 3 where there is not conclusive data to indicate that the closure is based on water quality conditions. Previous 305(b) reports did not provide a comparable listing category. In many instances, DMR has established administrative closures where a closed zone has been placed around existing discharge(s) but where no data has been collected to determine water quality attainment. The DEP regards the use of a Category 3 listing as appropriate for waters in these circumstances. The DEP participates in the coastal EMAP program cited in the comments, however, only very limited data was available for the coast of Maine at the time of the report. Future assessments will allow the use of this probabilistic-based data.
- *No date is given for completion of a regional TMDL for mercury (CLF).* There is no expected date of completion at this time. The Maine DEP is one of many states participating.

- *Concern that many assessment determinations were based on a draft rule for the use of biomonitoring data (MERDA).* Assessment of water quality using biomonitoring data and inclusion in the 305(b) assessment and 303(d) lists has occurred since 1992. Maine water quality statute provides explicit narrative biological standards with associated definitions that allow these biological assessments to be made. Maine has developed accompanying numerical methods (draft rule) that allow a more consistent analysis of information. Even without the numerical methods, these biological assessments would still be possible and provide an important analytical tool.
- *Biomonitoring based determinations may have been based on as little as one sample (MERDA).* The DEP considers biomonitoring a more powerful assessment tool than traditional water sampling because it is an integrative measure that assesses the performance of the biological community over a period of time (up to a year for most macroinvertebrates). Biological samples integrate conditions over space and time (a continuous sampling regime) that even high intensity water sampling cannot equal. Replication of biomonitoring sample results has been tested and is documented in the DEP's Biomonitoring Retrospective publication. The DEP also uses a probability cut-off that excludes the use of low probability results and further strengthens the confidence placed on the assessment.
- *Recommendation for a public hearing and listing decision by the Board of Environmental Protection where an assessment decision may affect private property (MERDA).* Decisions of impairment and nonimpairment in the 305(b) document and 303(d) list express extant conditions of water quality determined from empirical evidence collected through DEP monitoring and from other documented information sources. This evidence and the resultant decisions cannot be affected on the basis of "consequences to affected property owners" or other such factors suggested in the comment letter. The purpose of the Integrated Listing document is only to describe the condition of the State's waters and for those waters found to be impaired, to establish the need for a TMDL or other appropriate analysis to bring those waters into attainment. The report does not further define how the information should be used, or assess any consequences that may result. The standards and methods used for the assessment are described in the document and follow accepted State and EPA protocols.



State of Maine  
10 Digit HUC



228 Units  
Including Canada & New Hampshire Areas

0 10 20 40 60 80 100 Miles



## **Part II. SUMMARY ASSESSMENT OF FRESHWATER RIVERS AND STREAMS**

Maine is presently using the National Hydrography Dataset at a 1:100,000 resolution. Using that, 31,171 miles of rivers and streams are assessed. This is a decline in total miles (from 31,672 miles) that was used in previous 305b reports but that estimate was not based on a consistent methodology. Clearly, many more miles of small streams exist in the State and would be counted if a smaller scale resolution is used (expected in future reports).

Maine has four classes for the management of rivers and streams: AA, A, B, and C. Class AA waters are managed for their outstanding natural ecological, recreational, social or scenic qualities. Discharges, dams or other significant human disturbances are prohibited. Class A waters are managed for high water quality with limited human interference allowed. Direct discharges of pollutants are highly restricted in A waters. Class B waters are general-purpose waters and are managed to attain good quality water. Well-treated discharges of pollutants that have ample dilution are allowed. Class C waters are managed to at a minimum attain the fishable/swimmable goals of the Clean Water Act and maintain the structure and function of the biological community. Well-treated discharges of pollutants are allowed in C waters. Each class is managed for designated uses and has dissolved oxygen, bacteria and aquatic life standards. The distribution of the four classes is presented below.

**Distribution of River and Stream Classes**

Class	Percentage
AA	5.8%
A	44.1%
B	47.9%
C	2.2%

This assessment found 1161 miles (3.7%) of rivers and streams impaired for one or more designated uses (Categories 4 and 5) of the total assessed miles. These miles denote an increase of 432 miles (83% increase) of all river and stream miles assessed. Of those miles, 741 miles are impaired by the effects of pollutants or a combination of pollutant and non-pollutant stressors, are listed in Category 5, and will require the development of a TMDL. A river and stream segment is only listed in one category with two exceptions: (1) all Maine freshwaters are listed in Category 5-C (impaired by atmospheric deposition of mercury), (2) certain river and stream segments listed in Category 5-B-2 (impaired due to Combined Sewer Overflows with a CSO Master Plan established for control) may also be listed in another category because of the highly variable temporal and spatial effects of CSOs, and the Salmon Falls River/Piscataqua Estuary is listed in 4-A (TMDL complete for certain pollutants) but is still listed in Category 5-A for additional pollutants.

Mileages for CSO-only affected waters are not included since impairment from such sources are highly variable and usually of very short duration.

As with any assessment of this kind, the identification of impaired waters cannot be considered complete but rather is a reflection of the findings to date relative to the level of effort expended by the agency and other cooperating contributors. While new and expanded monitoring has identified many additional miles of impaired waters this should not be interpreted as an indication that Maine's waters are under some new or increasing stress. Rather, the State has been better able to assess its waters with improved monitoring tools and increased participation from cooperators. The DEP's recent monitoring strategy has placed greater emphasis on small streams in urban and agricultural settings. Most of the new impaired listings appear to be due to conditions that have probably been in place for many years.

It should be noted that Maine can state with good confidence that it has not had any pollution caused fish kills within this assessment period. This is a remarkable achievement given the history of such events in the State.

<b>Overall Use Support in Assessed Rivers and Streams</b> (linear miles)			
<u>Use Support</u>	<u>Evaluated</u>	<u>Monitored</u>	<u>Total</u>
Fully supporting	16,930	13,080	30,010
Partially supporting (consumption advisory for mercury)	(0)	(31,171)	(31,171)
<u>Not supporting</u>	<u>91</u>	<u>1070</u>	<u>1161</u>
<b>TOTAL</b>	<b>17,021</b>	<b>14,150</b>	<b>31,171</b>

Category 1. Rivers and streams attaining all designated uses and water quality standards, and no use threatened. There are 1072 miles of waters from 7 assessment units that the Department can confidently place in Category 1. These include waters in parks and ecological reserve lands where there is little human intrusion.

Category 2. Rivers and streams attaining some of the designated uses, no use is threatened and insufficient data and information is available for the remaining uses (but where there is a high expectation that all uses are attained). The majority of Maine's rivers and streams (28,686 miles, 92% of river and stream miles) fall in Category 2. The Department has current (monitored) data for 98 of the 228 assessment units.

Category 3. Rivers and streams with insufficient data and information to determine if designated uses are attained (but where there is some expectation that certain waters within the assessment unit or segment may not attain some uses). Twenty-six waterbody segments (250 miles) have been placed in Category 3. Waters were placed in Category 3 if previous data was inconclusive or possibly in error or where there was no identifiable cause or source (i.e. criteria are not met due to natural conditions as provided in 38 M.R.S.A. Section 464-4-C). Waters were also placed in Category 3 if similar waters in other assessment units had been determined to be impaired, and similar causes and sources were known to occur in the Category 3 waters.

Category 4. Rivers and streams that are impaired or threatened for one or more uses, but not requiring a TMDL (a TMDL has already been prepared, other controls are in place, or no pollutants are involved). Category 4 includes 35 segments (420 miles).

**Individual Use Support Summary for Rivers and Streams in Category 4**  
(linear miles)

<u>Use</u>	<u>TMDL complete</u>	<u>Other controls established</u>	<u>No pollutant involved</u>
Fishing (consumption)	0	323.2	0
Aquatic Life Support	66.5	12.5	27.3
Navigation	0	0	4.2

**Causes of Impairment in Rivers and Streams in Category 4**  
(linear miles)

<u>Cause Categories</u>	<u>Miles impaired</u>
Priority Organics	323.2
Low Oxygen (Enrichment)	66.5
Aquatic life	106
Flow modification	9.7
Habitat Alteration	17.6

**Sources of Impairment in Rivers and Streams in Category 4**  
(linear miles)

<u>Source Categories</u>	<u>Miles impaired</u>
Industrial Point Sources	309.2
Water withdrawal	1.3
Habitat – Impoundment (non-hydropower)	1.5
Habitat – Impoundment (Hydropower)	16.1
Flow modification (hydropower)	8.4
Land Disposal (landfills, haz waste)	68.5

Category 5. Rivers and streams that are impaired or threatened for one or more designated uses where a TMDL is required. Category 5 includes 136 segments (741 miles).

**Causes of Impairment in Rivers and Streams in Category 5**  
(linear miles)

<u>Cause Categories</u>	<u>Miles Impaired</u>
Priority Organics	288.6
Metals	3.3
Aquatic life	160.1
Low Oxygen (Enrichment)	323.5
Nutrients	111.1
Hydrologic modification	16.1
Pathogen Indicators	126.6
Habitat Alteration	17.2
pH	1.0

**Sources Impairment in Rivers and Streams in Category 5**  
(linear miles)

<u>Source Categories</u>	<u>Miles Impaired</u>
Unknown	28.2
Industrial Point Sources	41.5
Municipal Point Sources	74.3
Aquaculture PS	11.0
Other point source	2.0
Onsite Waste Treatment (domestic)	30.2
Agriculture NPS	189.7
Urban NPS (stormwater)	84.8
General development NPS	59.2
Other NPS (unspecified)	147.6
Resource extraction	4.3
Abandoned mining	2.0
Habitat modification	52.1
Flow modification (Hydropower)	16.1
Land Disposal (landfills, haz waste)	12.7
Sediment oxygen demand	3.0
Upstream eutrophic lake	23.5

## Part II. Summary Assessment of Lakes

The total area of Maine's 5782 Lakes and Ponds is estimated as 987,172 acres accounting for 1,543 square miles or 4.6% of the state's surface area.<sup>1</sup> Maine statute has designated one standard (GPA) for the classification of great ponds and natural lakes less than 10 acres in size. Specifically, Class GPA waters:

*A.) Class GPA waters shall be of such quality that they are suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. The habitat shall be characterized as natural.*

*B.) Class GPA waters shall be described by their trophic state based on measures of the chlorophyll "a" content, Secchi disk transparency, total phosphorus content and other appropriate criteria. Class GPA waters shall have a stable or decreasing trophic state, subject only to natural fluctuations and shall be free of culturally induced algal blooms which impair their use and enjoyment. The number of Escherichia coli bacteria of human origin in these waters may not exceed a geometric mean of 29 per 100 milliliters or an instantaneous level of 194 per 100 milliliters.*

*C.) There may be no new direct discharge of pollutants into Class GPA waters. Aquatic pesticide treatments or chemical treatments for the purpose of restoring water quality approved by the department and storm water discharges that are in compliance with state and local requirements are exempt from the no discharge provision. Discharges into these waters licensed prior to January 1, 1986, are allowed to continue only until practical alternatives exist. No materials may be placed on or removed from the shores or banks of a Class GPA water body in such a manner that materials may fall or be washed into the water or that contaminated drainage therefrom may flow or leach into those waters, except as permitted pursuant to section 480-C. No change of land use in the watershed of a Class GPA water body may, by itself or in combination with other activities, cause water quality degradation that would impair the characteristics and designated uses of downstream GPA waters or cause an increase in the trophic state of those GPA waters.*

The Department is highly confident that some of the GPA designated uses are attained by all lake waters in Maine. This high level of confidence is based on a classification approach that includes realistically attainable uses based on the *type* of water classified. These uses include: industrial process and cooling water supply, hydroelectric power generation and navigation. There is no credible reason to believe that these uses are

---

<sup>1</sup> Number and surface area obtained from Maine Department of Inland Fisheries and Wildlife's Lake Index file, which is being converted to a GIS dataset. Entire surface of border waters is included. The Maine DEP believes that the DIFW Lake Index file (determined from 15' USGS topographic maps; 1:62,500 scale) provides a more accurate estimate of lake numbers and acres than the USEPA RF3/DLG estimates (based on maps having 1:100,000 scale).



impaired in any of our lake waters. Thus, these uses are not designated as ‘assessed’ uses in the same manner as the more critical uses: drinking water, fish consumption, recreation in/on (primary contact or swimming), and aquatic life support.

Maine lakes exhibit a great amount of diversity as does the state’s topography and population. Maine’s 5782 lakes span a range in size of 1 acre to 74890 acres (Moosehead Lake). Of these, 804 lakes are listed as 1 acre in size and only 11 greater than 10,000 acres. Similarly, Maine lakes range from approximately 1 foot in depth to 316 feet deep (Sebago Lake). The 5782 lake list includes many waters that are small and/or shallow that are not at all representative of a true Maine lake but are more representative of transition waters or open water in a wetland. Class GPA does not expect more from a small, shallow lake than it can be reasonably expected to attain. For management purposes, the state designated a subset of the total population of lake as ‘Significant Lakes’ as requested by EPA under Section 314 in the early 1990s. Significant Lakes are defined as publicly owned lakes for which bathymetric/morphometric surveys exist, vulnerability modeling has been performed, or for which some trophic data has been gathered. These are generally the lakes that the state is most interested in managing or assessing. Lakes that are not considered ‘significant’ are tiny and/or shallow waters that are not managed as a ‘typical’ lake water.

<b>Table 1. Maine Lake Population Summary</b>		
	<u>Number</u>	<u>Acres</u>
Total Lakes	5782 (100%)	987,172 (100%)
Significant Lakes	2314 (40%)	959,193 (97%)

Municipal populations range from 1 to approximately 65,000 persons according to the 2000 U.S. Census data (~422 municipalities) with an additional 383 unorganized townships having no population. Municipalities having the highest populations are generally located along the larger rivers or in coastal areas. Development corridors typically fall around the major roadways in the state (e.g., Interstate 95). Much of Maine’s land area has considerable relief (change in elevation) or is considered remote (having no distributed utilities such as electricity or phone lines). Such a wide range in lake water types and geographic settings make it necessary to focus lake assessment efforts in areas most likely to have lake waters that do not attain Class GPA.

The 2002 Integrated Report represents a slightly new way to evaluate lake attainment status. EPA has established Listing Categories 1 through 5 in which lake waters are placed depending on our confidence in whether the water is ‘In Attainment’ or is ‘Impaired’. Lakes falling into Category 1 are lakes that ‘Fully Attain All Designated Uses’. Category 5 lakes are at the opposite end of the spectrum or are in ‘Non-attainment’ (impaired) and thus require the development of a TMDL. Lakes in Category 3 have insufficient data or information to determine to make attainment determinations. Table 2 summarizes categories and subcategories.

**Table 2**

<b>Listing Category</b>	<b><u>Category Explanation</u></b>
1	Attaining all standards
2	Attaining some standards; assumed to attain others
3	Attaining some standards; Insufficient/no data/info to determine if standard(s) are met for use that may be impaired
4a	TMDL complete
4b1	Expected to meet standards
4b2	Expected to meet standards when CSO is addressed
4c	Not impaired by a pollutant
5a	TMDL needed
5b	TMDL for bacteria needed
5c	Regional TMDL needed due to airborne Hg deposition
5d	TMDL would be needed if pollutant was not legacy pollutant (banned substance)

It is important to recognize that the use of the term ‘Threatened’ has changed in this assessment. EPA guidelines have restricted use of this designation to waters expected to be in non-attainment by the next assessment cycle. In past assessments, the term threatened was applied to lakes predicted to have a change in trophic state over a 25-50 year period using water quality modeling, and/or to lakes from which data indicated that one algal bloom had occurred in the recent past. No lakes are listed as ‘Threatened’ in the 2002 assessment. The term ‘watch list’ is used for a subset of Category 3 lakes for which additional data & time is needed to determine attainment status.

**Category 1. Lake waters attaining all designated uses and water quality standards, and no use is threatened.** For the purposes of this assessment, lakes having no population in their direct watersheds have been listed in ‘Category 1, Attaining all standards’, with the exception of five lakes. Four of these exceptions are listed in category 4c, in non-attainment of the Aquatic Life Use (habitat) due to non-pollutant (hydrologic modification); the remaining lake, Fitzgerald Pond, is presently listed in category 3, but is expected to continue recovery from a point-source discharge removal and be in full attainment when visited again.

Direct watershed populations were determined using the 2000 Census data for Maine municipalities and a database containing the areas of various towns that occur in over 2700 lake direct drainages. These 2700 or so lakes are the largest, most significant lake waters in the state. Towns associated with the lake in Inland Fisheries and Wildlife’s Lake Index were used to determine populations in direct watersheds of the remaining smaller lake waters (less likely to have watersheds spanning multiple towns). Since non-attainment of Class GPA focuses on lakes that deviate from natural conditions particularly, those induced by human activity, lakes having no population in their direct watershed have a very high degree of certainty of attaining all standards. The number of lakes listed in Category 1 is 2854, totaling 285,023 acres. Of these, 1016 (270,550 acres) are considered ‘Significant’ and 1838 (14,473 acres) are not. Waters are combined to the

10 digit HUC within which they are located (Appendix II, Category1). Lakes having population density estimates greater than 0.00 persons per square mile are listed in one of the other categories.

**Category 2. Lake waters attaining some of the designated use(s), no use is threatened, and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (with presumption that all uses are attained).** The Department is highly confident that these waters attain the following designated uses: drinking water (after disinfection/treatment), recreation in/on the water, fishing (excluding fish consumption), and as habitat for fish and other aquatic life. Category 2 contains 2850 lakes or 556,277 lake acres. Of these, 1220 (542,771 acres) are considered ‘Significant’ and 1630 (13,506 acres) are not. Waters are combined to the 10 digit HUC within which they are located (Appendix II, Category 2).

The ‘recreation in’ (swimming) and ‘aquatic life support’ uses are functionally linked with the subsequent GPA requirement that lakes ‘shall be free of culturally induced algal blooms’. Of this list, ‘recreation in’ would be one use for which some question might arise if it were not for a probability-based study the results of which suggest that most of the lakes in non-attainment due to nuisance algal blooms have been identified. Specifically, the REMAP study results from the mid-1990s indicated that 4% of that lake subpopulation (2.5% of the lake acreage) as being in non-attainment due to algal blooms. Those statistics can be used to evaluate how successful Maine’s lake assessment program has been at identifying specific lakes that support nuisance algal blooms. Looking at current assessment information from the overall population from which the REMAP lakes were selected reveals that 25 of 1903 lakes or 1.26% support nuisance blooms (30,253 of 926,092 acres or 3.27 % of lake surface area). The percentages compare quite closely to what one might expect given predictions based on the REMAP data results.

**Category 3. Lake waters with insufficient data and information to determine if designated uses are attained (with presumption that one or more uses may be impaired).** There are currently 36 lakes covering 32,693 acres listed in category 3 (Appendix II, Category 3) all of which are designated as ‘Significant’. These lakes may or may not be in attainment of ‘aquatic life’ and/or ‘recreation in’. The department has data that suggests that most of these waters are meeting some criteria but has evidence that suggests the lakes are ‘borderline’ with respect to others. These lakes are the highest priority for data collection over the next few years. Other lakes were removed from the ‘partially supporting’ list in the 2000 assessment and are now being delisted from the 1998 303(d) list. For these lakes, we have monitoring data suggesting that they now are in attainment of the designated uses originally involved in their 303(d) listing. Others have some inconclusive data that suggests they may be heading toward eventual non-attainment but not necessarily before the next assessment cycle, otherwise they would have been listed as ‘threatened’. Such lakes are now considered to be on our ‘watch list.

**Category 4. Lake waters that are impaired or threatened for one or more designated uses, but does not require development of a TMDL.** There are currently 16 lakes covering 90,344 acres listed in category 4, all of which are designated as

‘Significant’. These lakes are divided into three subcategories. The first subcategory, lake waters on which TMDLs have been completed (4-A), contains 5 lakes totaling 17,025 acres. Cobbosseecontee Lake and Madawaska Lake TMDLs were completed in 2000 and China Lake, East Pond and Sebasticook Lake TMDLs were completed in 2001. These represented the highest priority lakes on the 1998 303(d) list for TMDL completion. Monthly open-water season monitoring will likely continue on these lakes for a number of years.

Estes Lake (387 acres) is the only lake in category 4-B1, lakes having other pollution control requirements expected to result in attainment of standards in the near future. Estes is one of the few lakes in Maine having a point-source discharge from a municipal wastewater treatment facility. The treatment plant was upgraded in the mid-1990s and since then, the frequency of nuisance algal blooms has decreased as the lake responds and equilibrates to the nutrient load reduction.

Ten lakes (72,932 acres) are listed in category 4-C, lake water impairment not caused by a pollutant. All of these lakes are in non-attainment of aquatic life (habitat) standards due to hydromodification (drawdown). These lakes have been delisted from the 303(d) list established in 1998.

**Category 5. Lake waters that are impaired or threatened for one or more designated uses by a pollutant(s), TMDL required.** Four sub categories have been designated under category 5, however lakes have been listed in only two of them. Category 5-A currently includes 26 lakes (22,835 acres) all of which are designated as ‘Significant’ (lakes impaired by pollutants, required TMDL to be conducted by State of Maine). Appendix II, Category 5-A lists these lakes and indicates target dates for TMDL completion indicating development priority. Table 3 summarizes individual use support for lakes in category 5-A.

**Table 3. Individual Use Support Summary for Category 5a Lakes and Ponds (acres)**

<u>Use</u>	<u>Non Attaining</u>	<u>Attainment</u>
Drinking Water Supply (after disinfection/treatment)	0	22,835
Aquatic Life use Support	22,835	0
Fishing		
Fish Consumption (other than Hg)	0	22,835
Fish Consumption (due to Hg <sup>1</sup> )	22,835	0
Recreation In/ On	14,837	8,081
Navigation, Hydropower, Agriculture & industrial Supply	0	22,835

<sup>1</sup> Based on statewide fish consumption advisory; only category 5a lakes included.

All Maine lakes are listed in Category 5-C, lakes impaired by atmospheric deposition of mercury resulting in a statewide fish consumption advisory. Pollutants causing non-attainment and sources of these pollutants are summarized in Table 4.

**Table 4. Causes of Non-attainment in Category 5 Maine Lakes and Ponds (acres)**

<u>Cause Categories</u>	<u>Major Impact</u>	<u>Moderate/Minor Impact</u>
Nutrients	568	15,139
Siltation	0	13,807
Organic Enrichment	6,902	10,972
Methyl Mercury - (Fish Tissue)	987,172	0

**Table 5. Sources of Non-attainment in Category 5 Maine Lakes and Ponds (acres)**

<u>Source Categories</u>	<u>Major Impact</u>	<u>Moderate/Minor Impact</u>
Agriculture	329	13,124
Urban Runoff/Storm Sewers	6,902	14,895
Land Disposal	429	1,420
Atmospheric Deposition	987,283	0
Internal Nutrient Recycling	0	3281
Upstream Eutrophic Lake	83	0

## **Evaluation Criteria**

### **Designated Use: Aquatic Life Support**

Attainment: *Lakes exhibiting stable or decreasing (improving) trends in trophic state.*

Non-attainment: *Lakes that experience extreme water level fluctuations or severe turbidity. Lakes exhibiting a statistically valid deteriorating trend in trophic state as indicated by analysis of transparency data or a combination of data examination (dissolved oxygen, chlorophyll, and total phosphorus in addition to transparency) and best professional judgement.*

### **Designated Use: Fish Consumption**

Attainment: *No fish consumption advisories in effect.*

Non-attainment: *"Restricted Consumption" fish advisory or ban in effect during the reporting period for the general population or a subpopulation that could be at potentially greater risk (e.g., pregnant women, children). Restricted consumption is defined as limits on the number of fish of one or more species consumed per unit time. The limit on number consumed often varies with fish size. All Maine lakes are considered as Partially Supporting fish consumption due to mercury contamination.*

**Designated Use: Recreation In/On (swimming)**

**Attainment:** *Lakes that do not exhibit regular, nuisance algal blooms during the summer (high use) period.*

**Non-attainment:** *Lakes in which swimming is chronically (more than 5 of the past ten years) impaired during part of the recreational season due to culturally induced nuisance algal blooms. Bloom conditions are defined as Secchi Disk Transparency measurements of less than 2 meters in lakes having color less than 30 Standard Platinum Units (SPU). Lakes having color of 30 SPU or greater are considered impaired if other trophic data or professional judgment indicates that transparency is restricted due to high algal productivity and that the elevated productivity is due to anthropogenic alterations.*

**Designated Use: Drinking Water Supply** (after disinfection/treatment)

**Attainment:** *Lakes for which information/ data suggests that the water is suitable for drinking after reasonable treatment.*

**Non-attainment:** *Lakes designated as a water supply, for which information/ data suggests that the water is no longer suitable for drinking with reasonable treatment using current technology.*

**Trophic Status of Significant Publicly Owned Maine Lakes (required under Section 314)**

Lakes can be classified in many ways. For example, they may be classified according to their depth, size, conductivity, hardness, or according to the type of fish assemblages they support. The classification of a lake according to its productivity is known as *trophic* classification. Trophic status can be directly related to water column nutrient levels, algal populations and the resulting transparency.

A lake is considered productive or ***eutrophic*** when nutrient levels are high enough to support high levels of algal growth. Conversely, an unproductive or ***oligotrophic*** lake is low in nutrients and thus does not support high algal populations. Algal populations interfere with the transparency of the water so eutrophic lakes generally have lower transparencies than oligotrophic lakes. Lakes with intermediate levels of nutrients and algae are considered ***mesotrophic***. ***Hypereutrophic*** lakes support nuisance algal blooms year round. Lakes having a color resembling weak tea are stained with humic acids and can also be classified as ***dystrophic***. In this report, dystrophic lakes fall under one of the other classifications (eutrophic, mesotrophic or oligotrophic).

The Maine Department of Environmental Protection determines the trophic state of a lake by using a combination of Secchi disk transparency, Chlorophyll *a*, Total Phosphorus concentrations and best professional judgement. When adequate data exists, Trophic State Indices (TSIs) calculated from each of the previously mentioned parameters will range from 1 to approximately 120. An overall TSI, calculated from the average of 2-3 parameter TSIs, provides the most reliable trophic estimate. Relatively few lakes, however, have enough data to allow this calculation.

The table on page A-17 above (section on Interpretation of Data) illustrates how TSI values compare to trophic parameters in the determination of trophic state. No Maine lakes support nuisance algal blooms year round, thus hypereutrophic status is not included in this table. Section 314 requires a summary of trophic classification for Maine's significant lakes. This summary is compiled using the best information available. TSIs are considered the most accurate; in lieu of a TSI, actual parameter distributions are used. When little or no standard trophic data are available but information exists regarding a supported fishery, or, modeling based on morphometry has been done, a trophic assignment is made using best professional judgement of either DEP lake biologists or Maine Department of Inland Fisheries and Wildlife (DIFW) fisheries biologists. When a DEP determination is not available, the DIFW assignment is used with the recognition that their trophic assignment reflects productivity of the whole ecosystem rather than just the water. This occasionally can result in a rating slightly more productive than what the chemistry might reveal if data were available. Regardless, all of these approaches are considered valid for the purposes of this report.

Table 6 below summarizes overall trophic status of significant Maine lakes. As in past assessments, no lakes have been assigned to the "dystrophic" category. Maine defines dystrophy as high color [ $>50$  Standard Platinum Units (SPU)] due to humic acids often accompanied by depressed dissolved oxygen levels, a definition not truly exclusive of other trophic categories. Degree of dystrophy is considered when evaluating lake data however, trophic status assignment continues to be based on primary productivity evaluations (DEP) or whole ecosystem productivity (DIFW). For example, Threecornered Pond in Augusta is classified in this report as eutrophic but could also be classified as dystrophic.

**Table 6. Trophic Status of Significant Publicly Owned Maine Lakes**

<u>Status</u>	<u>Number of Lakes</u>	<u>Acreage of Lakes</u>
Total	2,314	959,193
Oligotrophic	131	111,806
Mesotrophic	1109	662,537
Eutrophic	656	153,055
Hypereutrophic	0	0
Dystrophic	N/A	N/A
Unknown	580	32,865

## **PART IV. SUMMARY ASSESSMENT OF ESTUARINE AND MARINE WATERS**

### **Background**

Maine has three classes for the management of estuarine and marine waters: SA, SB, and SC. SA waters are managed for high water quality with limited human interference allowed. No direct discharges of pollutants are allowed in SA waters. SB waters are general-purpose waters and are managed to attain good quality water. Well-treated discharges of pollutants that have ample dilution are allowed. SC waters are managed for the lowest water quality but must be fishable/swimmable and maintain the structure and function of the biological community. Well-treated discharges of pollutants are allowed in SC waters. Each class is managed for designated uses and has dissolved oxygen, bacteria and aquatic life standards. The distribution of the three marine and estuarine classes is presented in Table 1 below.

**Table 1**  
**Distribution of Marine and Estuarine Classes**

Class	Percentage	Acres
SA	7%	133,379
SB	92%	1,672,368
SC	1%	18,893

**This section provides an assessment of the degree to which water quality supports the designated uses. Applicable monitoring results and attainment assessments are summarized within each of these two categories. Appendix 1 lists waterbodies assigned to each of the listing categories described in the Listing Methodology section of this report.**

### **Designated Use: Shellfish Propagation and Harvest of Shellfish**

The Department of Marine Resources (DMR) assesses information for shellfish growing areas to ensure that shellfish harvested are safe to eat. Shellfish areas are closed by DMR if they find that the area has elevated levels of bacteria or if it is felt that the area is threatened by potential sewage pollution problems. Areas are listed in Category 3 in Appendix 1 until the reason for the closure is determined (from DMR). Shellfish areas are classified as approved for harvesting (supporting its designated use), conditional or restricted (partially supporting its designated use) under a designated set of environmental conditions or prohibited (not supporting its designated use). Table 2 presents the percentage and acres of the areas for each classification of Maine's 1,825,008 acres of flats and waters. Since 1998, 52,979 additional shellfish acres have been opened.



**Table 2**  
**Classification of Shellfish Harvesting Areas**

Classification	Percentage	Acres
Supporting (approved)	89.64	1,635,979
Partially supporting (conditional or restricted)	1.81	33073.1
Not supporting (prohibited)	8.55	155,955.90
Total	100.00	1,825,008

### **Designated Use: Recreation in and on the Water**

There is limited monitoring of Maine beaches. In Maine, the monitoring of town beaches and providing public notification is the jurisdiction of the municipality. Towns that have combined sewer overflows that may impact swimming areas are required to monitor the swimming areas and report the data and number of closures to DEP annually. The State Parks are monitored monthly by the State Parks. Acadia National Park was monitored in the past by the park but is now monitored by a volunteer group. Private beaches are responsible for monitoring their own beaches. DEP's monitoring focuses on ensuring that areas influenced by licensed discharges are not a threat to swimmer health. A few beaches are in partial support of their designated use because of combined sewer overflows. Of the beaches monitored there were only two closures posted, at Willard Beach in South Portland. These closures were not attributed to CSO activity. The CSO at Willard Beach did not discharge in 2001. East End Beach in Portland has had closures in the past; however, there were none in 2001. Sandy Beach in Rockland is still closed because of a CSO.

### **Designated Use: Fishing**

A human health consumption advisory has existed since 1992 coast wide against the consumption of lobster tomalley. No evidence of elevated levels of toxic contaminants was found in lobster meat. The advisory was expanded to include bluefish and striped bass in 1996. Most of these fish migrate to the Maine coast in the summer. The entire Maine coast is in partial support of its designated use due to these consumption advisories.

### **Designated Use: Marine Life Use Support**

#### **Attainment of Dissolved Oxygen Standards**

The Royal River estuary and the Mousam River estuary are impaired because sections of these estuaries do not meet State Standards for dissolved oxygen. The Piscataqua River estuary has a completed TMDL but implementation has not begun. A new license, based on modeling and sampling, was issued to the wastewater treatment plant in Warren in order to resolve the dissolved oxygen problems in the St. George River estuary. There are

insufficient new data to determine if dissolved oxygen standards are being met. The discharges into Goosefare Brook and the Ogunquit River estuary have been moved offshore in order to resolve dissolved oxygen problem in these estuaries. The upper New Meadows estuary and “Lake” appear to have dissolved oxygen problems because of a partial impoundment on Old Route 1 at the Brunswick-West Bath town line. Generally, data from various studies and volunteer monitoring groups show oxygen levels along the Maine coast are adequate for the protection of aquatic life. Although some estuaries contain oxygen levels that do not meet the dissolved oxygen standards of their assigned classification, it was concluded that many of the levels measured were a result of natural processes. DEP is reviewing the appropriateness of statutory dissolved oxygen standards for estuarine and marine waters.

### **Eutrophication**

Although there are estuaries that do not meet state water quality dissolved oxygen standards (see previous section), incidences of hypoxia ( $>0\text{--}\leq 2$  mg/l dissolved oxygen) or anoxia appear to be episodic. New Meadows “impoundment” (salinity over 20 ppt) has anoxic conditions in the deep hole each summer. Causes of events have ranged from influxes of large schools of fish, algae blooms being blown into a small bay to unknown. While toxic algae blooms occur periodically in the spring and summer, the blooms are showing no trends and are not considered to be related to nutrient enrichment from anthropogenic sources. No nuisance blooms (e.g. *Phaeocystis*) have been reported recently. Trends in macroalgal abundance of green algae (e.g. *Enteromorpha*) are unknown but the abundance appears to be increasing in some areas and is of concern to some of the coastal volunteer groups. The results of a statistical analysis conducted for the 1996 dissolved oxygen study for 16 estuaries along the coast of Maine (Dissolved Oxygen in Maine Estuaries and Embayments: 1996 Results and Analyses by John Kelly; Aug. 30, 1997; DEP W97-23) suggest land-derived nitrogen loading. In many areas, particularly those from eastern Maine to offshore Penobscot Bay, a major nutrient source appears to be from offshore waters. Overall, the high tidal range, the relatively low river flows (except the Penobscot and the Kennebec), the relatively low population densities in most areas and limited agricultural nutrient runoff results in limited anthropogenic impacts from nutrients at this time. Small, poorly flushed bays that have watersheds with growing populations are where signs of eutrophication such as nuisance macroalgae, occasional phytoplankton blooms in the summer and lowered dissolved oxygen levels have started to emerge. At this time the impaired use is principally from the toxic algae blooms. The Department of Marine Resources with the help of volunteers closes shellfish harvesting areas to protect the public health when toxic algae blooms (“red tide”) occur.

### **Designated Uses: Navigation, Hydropower, Industrial Supply and Aquaculture**

Aside from general provisions, there are no criteria for assessing these designated uses. The protection of the uses described above should result in the protection of navigation, hydropower, industrial supply and aquaculture.

## Summary Assessment of Non-Attainment of Designated Uses

A summary of the extent to which designated uses of Maine water quality classifications are being supported is presented in Table 3. Table 4 summarizes attainment of the designated uses of State Law and the Clean Water Act. The total sizes of waters not fully supporting uses are broken down by cause categories (Table 5) and source categories (Table 6).

**Table 3**  
**Overall Use Support in Assessed Marine and Estuarine Waters in Maine** (square miles)

Use Support	Evaluated	Monitored	Total
Fully supporting	2,255.2	300.0 <sup>1</sup>	2,555.2
Partially supporting <sup>2</sup>	0.0	51.7	51.7
Not supporting	0.0	244.7	244.7
<b>TOTAL</b>	<b>2,255.2</b>	<b>595.4</b>	<b>2851.6</b>

**Table 4**  
**Individual Use Support Summary for Marine and Estuarine Waters in Maine** (square miles)

Use	Supporting	Partially Supporting	Not Supporting	Not Attainable
Fish Consumption <sup>3</sup>	0	0	2851.6	0
Shellfish <sup>4</sup> (excluding tomalley)	2,555.2	51.7	244.7	0
Shellfish <sup>3</sup> (lobster tomalley only)	0	0	2851.6	0
Aquatic Life Support	2851.1	0	0.5	0
Swimming (including Secondary Contact)	2851.4	0.02	0	0

<sup>1</sup> Estimated miles of monitored estuarine/marine waters.

<sup>2</sup> Partial support does not include statewide advisories for mercury in fish or dioxin in lobster tomalley.

<sup>3</sup> Based on a statewide fish/shellfish consumption advisory.

<sup>4</sup> Area estimated by the Department of Marine Resources.

**Table 5**  
**Causes of Non-attainment in Marine and Estuarine Waters in Maine** (square miles)

Cause Categories	Major Impact	Moderate/Minor
Impact		
Priority pollutants	2851.6	0
Organic Enrichment	0	1.4
Pathogen Indicators	244.7	51.7

**Table 6**  
**Sources of Surface Water Non-attainment in Maine in Estuarine and Marine Waters** (square miles)

Source Categories	Major Impact	Moderate/Minor Impact
Industrial Point Source	2851.6	
Municipal Point/Overboard discharge	244.7	
Combined Sewer Overflows		51.7
Urban Runoff/Storm Sewers		51.7